



**GAMATRONIC**

*Our Power, Your Confidence*



## Industrial UPS & Inverter Systems **GTSI Series**

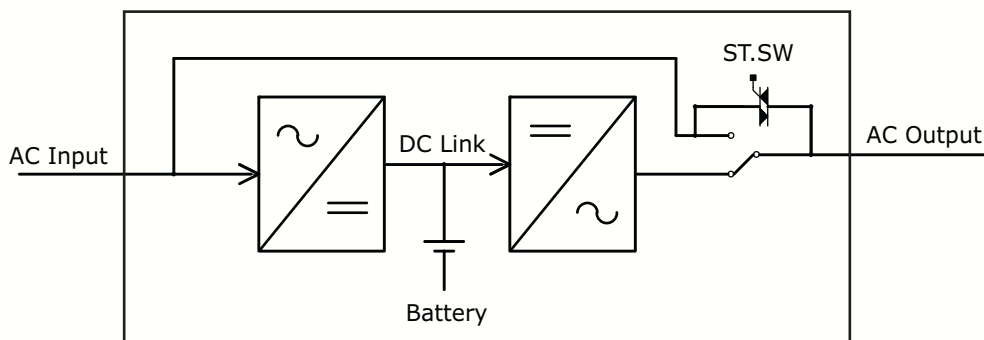
### Applications

GTSI industrial UPS and Inverter systems are primarily designed to meet requirements for applications in the Oil & Gas, Petrochemical, Chemical, Steel & Metallurgy, Manufacturing, and Power Industries.

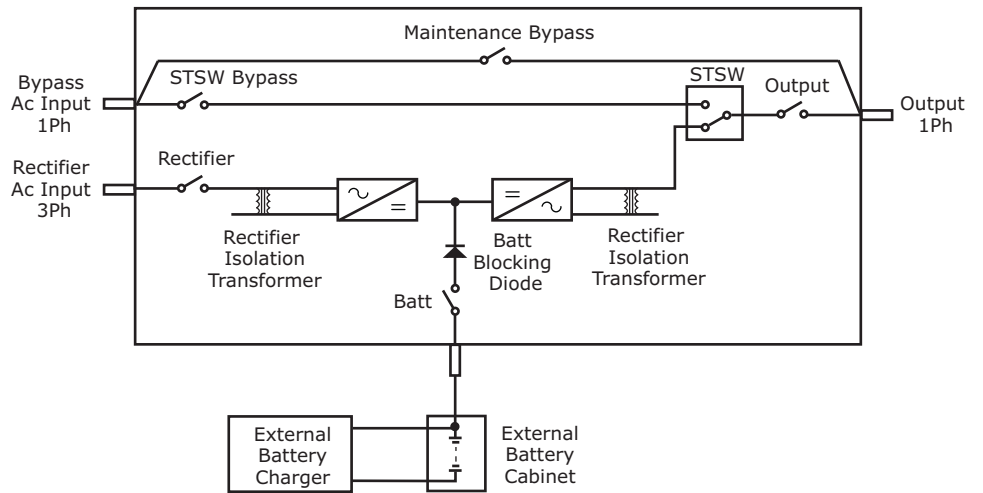
### Topology

- ▶ True on-line double conversion, VFI, as per IEC 62040-3
- ▶ Robust 6-pulse/12-pulse phase controller rectifier
- ▶ Optional rectifier input isolation transformer for full isolation of the dc circuits
- ▶ Built-in inverter isolation transformer
- ▶ Extremely reliable hybrid-type static switch with dual SCRs
- ▶ High-frequency, PWM-controlled, full bridge IGBT inverter

### Gamatronic Double Conversion, On-Line Batteries UPS System Topology

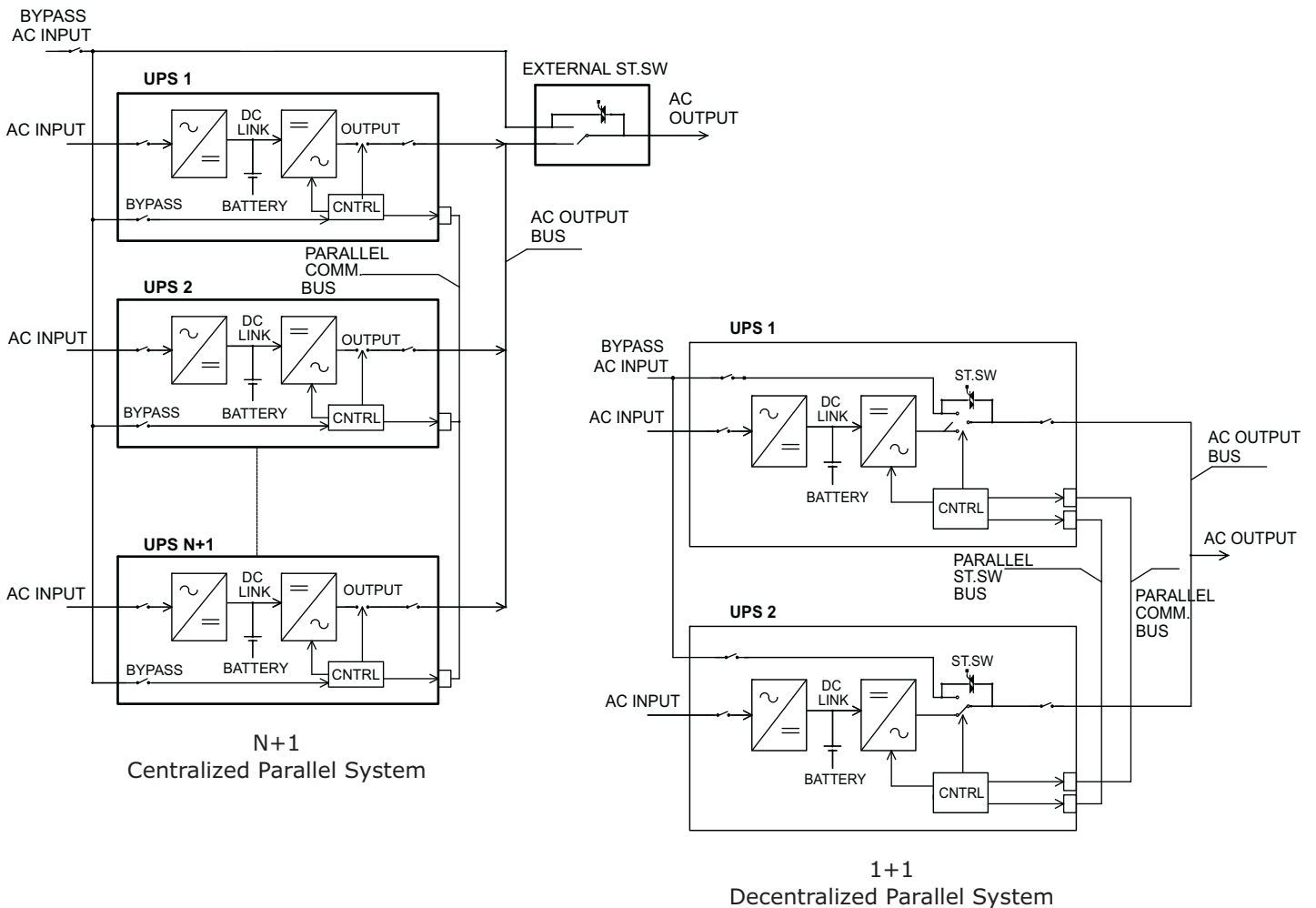


# Industrial UPS & Inverter Systems GTSI Series



## Parallel Operation

- ▶ Direct connection of up to 10 units in parallel
- ▶ Precise synchronization via microprocessor based- digital PLL
- ▶ Active current-sharing circuit ensures accurate sharing of load between paralleled units
- ▶ Available in both centralized and decentralized topologies



## Specifications

MODEL		GTSI	
Ratings	3-3 3-1	10,15,20,30,40,60,80,100,125,160, 200, 250 kVA	10,15,20,30,40,60,80, 100, 125, 160 kVA
Topology	VFI, True On-Line double conversion, built-in inverter isolation transformer, optional Ac double isolation		
Control	High performance multi-task RISC micro-controller for full and precise digital control of power circuits, protections, synchronization, measurements, and communication		
RECTIFIER			
Input Voltage	3X380/400/415 Vac $\pm 20\%$ , other voltages available on request		
Frequency	50/60Hz $\pm 5\text{Hz}$		
Rectifier Topology	6-pulse phase-controlled rectifier (optional 12-pulse phase controller rectifier)		
Power Factor	$>0.8$ For 6-pulse controller rectifier, $> 0.9$ for 12-pulse controlled rectifier		
THDi	$<30\%$ for 6-pulse controller rectifier, $< 10\%$ for 12-pulse controller rectifier		
Nominal Dc Voltage	110V/220/384Vdc $\pm 1\%$ , other voltages available on request		
Ac Ripple	$<1\%$ RMS		
Walk in Time	12-15 seconds		
Dc Isolation	Optional input Isolation transformer for full isolation of Dc-circuits from Ac input and output		
Protections	AC input and battery circuit breakers, rectifier Dc current limit, battery recharge current limit, DC-over voltage protection, and rectifier over-temperature protection		
INVERTER			
Topology	High frequency PWM-controlled IGBT full bridge with built-in inverter isolation transformer		
Output Voltage	220/230/240VAC $\pm 1\%$ , 3X380VAC/400/415VAC $\pm 1\%$ , other voltages available on request		
Frequency	Free running: 50Hz/60Hz $\pm 0.01\%$ Tracking range: $\pm 0.5/1/2/3/4\text{Hz}$ selectable		
Slew Rate	1Hz/second		
Waveform	Pure sinusoidal		
THDv	$< 2\%$ at linear load		
Dynamic Response	$\pm 2\%$ , recovery within 10msec		
Phase Displacement	$\pm 1^\circ$ includes even under asymmetrical load (for three-phase output models)		
Load Power Factor	0.8 rated, allowable power factor range 0.6 lag to 0.6 lead		
Load Crest Factor	Up to 3:1		
Overload	Transfer to bypass: 125% for 10min, 150% for 30 sec, 1000% for 20msec		
Protections	Inherent inverter pulse by pulse protection (over current and short-circuit electronic protection), Over and under Dc input voltage protection, Over and under Ac voltage protection, input semiconductor fuse, overload, inverter over temperature, Fast monitor transfers the load immediately to bypass when Dc voltage is lost		
Rejection Ration	$> 100\text{ dB}$		
STATIC SWITCH BYPASS AND OUTPUT			
Topology	Hybrid-type static switch with dual SCRs		
Transfer time	$\leq 0.5\text{ msec}$		
Efficiency	$>99\%$		
Overload	600% for 2 sec, 1000% for 1 sec		
Protections	Bypass input circuit breaker; Ac output circuit breaker; built in backfeed protection; programmable bypass input over and under voltage protection; programmable over and under bypass frequency; output voltage monitor transfers the load to bypass on inverter fail. Optional "live static switch" option always outputs bypass on inverter shutdown		

## Specifications

SYSTEM AND GENERAL	
Ac-Ac efficiency	89-93.5 % depending on type
Dc-Ac efficiency	92-95.5 % depending on type
MTBF	>250,000 hours with standard static switch bypass
Fault-clearing capacity	30 % of the UPS nominal voltage. Current rated gG fuse within 10 msec as per IEC 60269, and bypass available
Battery Management and Protections	<ul style="list-style-type: none"> <li>- ABM automatic battery management includes: adjustable recharge current limit, temperature compensated charger, automatic battery test every 200 hours, manual battery test</li> <li>- Programmable End of discharge (Inverter cutoff) voltage level</li> <li>- Optional battery- recharges blocking system with monitoring for Battery systems with external battery charger</li> <li>- Adjustable Float charging voltage</li> <li>- Battery back-up remaining time calculation</li> </ul>
Front Panel	<ul style="list-style-type: none"> <li>- LCD display which shows the status of the system, the measurements, and the alarm messages.</li> <li>- Mimic diagram that shows the flow of power</li> <li>- Information and function buttons</li> <li>- Indication LEDs</li> <li>- Buzzer alarm</li> <li>- Log of last 256 events</li> </ul>
System Displayed Parameters	<ul style="list-style-type: none"> <li>- Rectifier: Ac input voltage, Dc voltage, battery current, and Ac input currents (optional)</li> <li>- Inverter: Ac voltage, frequency, and synchronization</li> <li>- Bypass: Ac voltage, current, and frequency</li> <li>- Output: Ac voltage, current, and frequency</li> <li>- Internal temperature and status over-temperature protections</li> <li>- Battery voltage and current status</li> <li>- Real time clock and accumulative run-time</li> </ul>
Parallel Operation	Direct Parallel connection, precise synchronization via digital-PLL, accurate current sharing. Available in Centralized and Decentralized topologies for N+1 redundancy and/or Power Sharing
Communication Interfaces	<ul style="list-style-type: none"> <li>- Dry-contact alarm relay board extendable up to 25 alarms</li> <li>- RS232 interface</li> <li>- Optional RS485 interface</li> <li>- Optional SNMP adaptor (GMACi)</li> <li>- Optional Wireless communication device via cellular interface</li> </ul>
Cooling	Redundant forced air cooling
Noise Level	<55~68dBA depending on type and load percentage
Temperature	Operating: -10 to 45 °C Storage: -20 to 70 °C
Humidity	Up to 95% (non-condensing)
Altitude	2000 m w/o de-rating
Available cabinets*	Front access , protection grade IP20, optional IP32 Dimensions WXD <sub>X</sub> H: 550×800×1300 (mm), 700×800×1900 (mm), 1350×800×1900 (mm) Color RAL 7047
Safety	IEC 62040-1
EMC	IEC 62040-2, EN-50091-2
Design & Performance	IEC 62040-3
Conformity	CE

(\* ) Dimensions and weight will vary depending on the configuration requested.

Gamatronic GTSI series is called as [电源先锋] in Chinese

All of the above specifications are typical and subject to change without notice.

## Specifications

<b>MODEL</b>		<b>INV-GTSI</b>
Ratings	3-Phase 1-Phase	10,15,20,30,40,60,80,100,125,160 kVA 10,15,20,30,40,60,80 kVA
Topology	High frequency PWM-controlled IGBT full bridge with built-in inverter isolation transformer	
Control	High performance multi-task RISC micro-controller for full and precise digital control of power circuits, protections, synchronization, measurements, and communication	
<b>INVERTER</b>		
Dc input	110/220/384 Vdc ( $\pm 20\%$ ) Other voltages available on request	
Output voltage	3X380/400/415 Vac $\pm 1\%$ Other voltages available on request	
Frequency	Free running: 50/60 Hz $\pm 0.01\%$ Tracking range: $\pm 0.5/1/2/3/4$ Hz selectable	
Slew rate	1 Hz/second	
Waveform	Pure sinusoidal	
THDv	<2 % with linear load	
Dynamic response	$\pm 2\%$ , recovery within 10 msec	
Phase displacement	$\pm 1^\circ$ for three-phase output models includes asymmetrical loads	
Load power factor	0.8, allowable power factor range 0.3 lag to 0.6 lead	
Load crest factor	Up to 3:1	
Overload	Transfer to bypass: 125 % for 10 min, 150% for 30 sec, and 1000 % for 20 msec	
Protections	Inherent inverter pulse-by-pulse protection (over current and short-circuit electronic protection); over- and under-voltage for Dc and Ac input; input semi-conductor fuse; overload, inverter over-temperature; fast monitor transfers the load to bypass immediately when dc voltage is lost; Dc input circuit breaker	
Rejection ration	>100dB	
<b>STATIC SWITCH BYPASS AND OUTPUT</b>		
Topology	Hybrid-type static switch with dual SCRs	
Transfer time	$\leq 0.5$ msec	
Efficiency	>99%	
Overload	600% for 2 sec, 1000% for 1 sec	
Protections	Bypass input circuit breaker; Ac output circuit breaker; built in backfeed protection; programmable bypass input over and under voltage protection; programmable over and under bypass frequency; output voltage monitor transfers the load to bypass on inverter fail. Optional "live static switch" option always outputs bypass on inverter shutdown	

## Specifications

SYSTEM AND GENERAL	
Dc-Ac efficiency	92-95.5 % depending on type
MTBF	>250,000 hours with standard static switch bypass
Fault-clearing cap.	30 % of the Inv. nominal. Current rated gG fuse according to IEC 60269 within 10 msec and bypass available
Front panel	<ul style="list-style-type: none"> <li>- LCD screen: displays system status, measurements, alarm messages</li> <li>- Mimic diagram illustrating the power flow</li> <li>- Information and function buttons</li> <li>- Indication LEDs</li> <li>- Buzzer alarm</li> <li>- Log of last 256 system events</li> </ul>
Viewable parameters include:	<ul style="list-style-type: none"> <li>- Input:dc voltage and current</li> <li>- Inverter:Ac voltage, frequency, and synchronization</li> <li>- Bypass:Ac voltage, current, and frequency</li> <li>- Output:Ac voltage, current, and frequency</li> <li>- Internal temperature and status of over-temperature protections</li> <li>- Real time clock and accumulated operation time</li> </ul>
Parallel operation	Direct parallel connection, precise synchronization via digital-PLL, accurate current-sharing. Available in centralized and decentralized topologies for N+1 redundancy and/or power sharing.
Communication interfaces	<ul style="list-style-type: none"> <li>- Dry-contact alarm relay board</li> <li>- RS232 interface</li> <li>- Optional RS485 interface</li> <li>- Optional SNMP adaptor (GMACi)</li> <li>- Optional Wireless communication device via cellular interface</li> </ul>
Cooling	Redundant forced air cooling
Noise level	<55~68dBA depending on type and load percentage
Temperature	Operating: -10 to 45 °C Storage: -20 to 70 °C
Humidity	Up to 95 % (non-condensing)
Altitude	2000 m without derating
Available cabinets*	Front access, protection grade IP20, optional IP32 Dimensions WxDxH: 550×800×1300 (mm), 700×800×1900 (mm) 1350×800×1900 (mm) RAL 7047 Color
Safety	IEC 62040-1
EMC	IEC 62040-2, EN-50091-2
Design & performance	IEC 62040-3
Conformity	CE

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